IN THE CLAIMS

Claim 1 (withdrawn) A simulation method which predicts the distribution of the amount of polishing of the polished surface of an object of polishing after this object of polishing has been polished by causing relative motion between this object of polishing and a polishing body that is supported by a substrate while applying a load between this object of polishing and the above-mentioned polishing body,

this simulation method being characterized by the fact that a step which predicts the amount of polishing in individual partial regions of the polished surface of the above-mentioned object of polishing following the polishing of this object of polishing includes an indicator which indicates the height distribution of the polishing surface of the above-mentioned polishing body with reference to the above-mentioned substrate when no pressure is applied to this polishing body, as one of the parameters used in the calculations performed in this step, and

the above-mentioned indicator is one indicator or a combination of two or more indicators selected from a set comprising the number of times that a dressing process is performed on the above-mentioned polishing body, the cumulative time of the dressing processes performed on the above-mentioned polishing body, the number of times that polishing is performed on the above-mentioned object of polishing by the above-mentioned polishing body, and the cumulative time of the polishing that is performed on the above-mentioned object of polishing by the above-mentioned polishing body.

Claim 2 (withdrawn) The simulation method according to Claim 1, which is characterized by the fact that the above-mentioned height distribution of the above-mentioned polishing body is

successively predicted on the basis of the above-mentioned indicator during the time of use of the above-mentioned polishing body, and the amount of polishing in the above-mentioned partial regions is predicted on the basis of the most recently predicted height distribution.

Claim 3 (withdrawn) The simulation method according to Claim 2, which is characterized by the fact that the prediction of the above-mentioned height distribution is performed following a dressing process that dresses the above-mentioned polishing body.

Claim 4 (withdrawn) The simulation method according to Claim 2, which is characterized by the fact that the prediction of the above-mentioned height distribution is performed after a polishing process is performed by the above-mentioned polishing body on an object of polishing that is different from the- above-mentioned object of polishing.

Claim 5 (withdrawn) The simulation method according to Claim 2, which is characterized by the fact that the prediction of the above-mentioned height distribution is accomplished by referring to a look-up table or equation which shows the relationship between the above-mentioned height distribution and one parameter or a combination of two or more parameters selected from a set comprising the number of times that a dressing process is performed on the above-mentioned polishing body, the cumulative time of the dressing processes performed on the above-mentioned polishing body, the number of times that polishing is performed on the above-mentioned object of polishing by the above-mentioned polishing body, and the cumulative time of the polishing

that is performed on the above-mentioned object of polishing by the above-mentioned polishing body.

Claim 6 (withdrawn) The simulation method according to Claim 2, which is characterized by the fact that the prediction of the above-mentioned height distribution is performed in accordance with the equation of Preston.

Claim 7 (withdrawn) The simulation method according to Claim 1, which is characterized by the fact that the polishing of the above-mentioned object of polishing is chemical mechanical polishing which is performed with a polishing agent interposed between the above-mentioned polishing body and the above-mentioned object of polishing.

Claim 8 (withdrawn) A simulation method which predicts the shape of the polished surface of an object of polishing or the film thickness distribution on the side of the above-mentioned polished surface after the above-mentioned object of polishing has been polished by causing relative motion between this object of polishing and a polishing body that is supported by a substrate while applying a load between this object of polishing and the above-mentioned polishing body, this simulation method being characterized by the fact that the above-mentioned shape or the above-mentioned film thickness distribution of the above-mentioned object of polishing is predicted using the simulation method according to Claim 1.

Claims 9-10 (canceled)

Claim 11 (withdrawn) A simulation apparatus which predicts the distribution of the amount of polishing of the polished surface of an object of polishing after this object of polishing has been polished by causing relative motion between this object of polishing and a polishing body that is supported by a substrate while applying a load between this object of polishing and the above-mentioned polishing body,

this simulation apparatus being characterized by the fact that the apparatus has prediction means for predicting the amount of polishing in individual partial regions of the polished surface of the above-mentioned object of polishing following the polishing of this object of polishing, these prediction means use an indicator which indicates the height distribution of the polishing surface of the above-mentioned polishing body with reference to the above-mentioned substrate when no pressure is applied to this polishing body, as one of the parameters used in the calculations performed by these prediction means, and the above-mentioned indicator is one indicator or a combination of two or more indicators selected from a set comprising the number of times that a dressing process is performed on the above-mentioned polishing body, the cumulative time of the dressing processes performed on the above-mentioned polishing body, the number of times that polishing is performed on the above-mentioned object of polishing by the above-mentioned polishing body, and the cumulative time of the polishing that is performed on the above-mentioned object of polishing by the above-mentioned polishing body.

Claim 12 (withdrawn) The simulation apparatus according to Claim 11, which is characterized by the fact that the apparatus further comprises means for successively predicting the above-

mentioned height distribution of the above-mentioned polishing body on the basis of the above-mentioned indicator during the time of use of this polishing body, and the above-mentioned prediction means predict the amount of polishing in the above-mentioned partial regions on the basis of the most recently predicted height distribution.

Claim 13 (withdrawn) The simulation apparatus according to Claim 12, which is characterized by the fact that the above-mentioned means for predicting the above-mentioned height distribution perform the prediction of the above-mentioned height distribution following a dressing process that dresses the above-mentioned polishing body.

Claim 14 (withdrawn) The simulation apparatus according to Claim 12, which is characterized by the fact that the above-mentioned means for predicting the above-mentioned height distribution perform the prediction of the above-mentioned height distribution following a polishing process performed by the above-mentioned polishing body on an object of polishing that is different from the above-mentioned object of polishing.

Claim 15 (withdrawn) The simulation apparatus according to Claim 12, which is characterized by the fact that the above-mentioned means for predicting the above-mentioned height distribution perform the prediction of the above-mentioned height distribution by referring to a look-up table or equation which shows the relationship between the above-mentioned height distribution and one parameter or a combination of two or more parameters selected from a set comprising the number of times that a dressing process is performed on the above-mentioned

polishing body, the cumulative time of the dressing processes performed on the above-mentioned polishing body, the number of times that polishing is performed on the above-mentioned object of polishing by the above-mentioned polishing body, and the cumulative time of the polishing that is performed on the above-mentioned object of polishing by the above-mentioned polishing body.

Claim 16 (withdrawn) The simulation apparatus according to Claim 12, which is characterized by the fact that the above-mentioned means for predicting the above-mentioned height distribution perform the prediction of the above-mentioned height distribution according to the equation of Preston.

Claim 17 (withdrawn) The simulation apparatus according to Claim 11, which is characterized by the fact that the polishing of the above-mentioned object of polishing is chemical mechanical polishing which is performed with a polishing agent interposed between the above-mentioned polishing body and the above-mentioned object of polishing.

Claim 18 (withdrawn) A simulation apparatus which predicts the shape of the polished surface of an object of polishing or the film thickness distribution on the side of the above-mentioned polished surface after the above-mentioned object of polishing has been polished by causing relative motion between this object of polishing and a polishing body that is supported by a substrate while applying a load between this object of polishing and the above-mentioned polishing body, this simulation apparatus being characterized by the fact that the apparatus

comprises prediction means for predicting the above-mentioned shape or the above-mentioned film thickness distribution of the above-mentioned object of polishing using the simulation method according to Claim 1.

Claim 19 (withdrawn) A simulation apparatus which predicts the shape of the polished surface of an object of polishing or the film thickness distribution on the side of the above-mentioned polished surface after the above-mentioned object of polishing has been polished by causing relative motion between this object of polishing and a polishing body that is supported by a substrate while applying a load between this object of polishing and the above-mentioned polishing body, this simulation apparatus being characterized by the fact that the apparatus comprises prediction means for predicting the above-mentioned shape or the above-mentioned film thickness distribution of the above-mentioned object of polishing using the simulation apparatus according to Claim 11.

Claim 20 (withdrawn) A control parameter or control program preparation apparatus which prepares control parameters or a control program used to control a polishing apparatus which polishes an object of polishing by causing relative motion between this object of polishing and a polishing tool which has a polishing body and a substrate that supports the surface of this polishing body on the side opposite the polishing surface while applying a load between the above-mentioned object of polishing and the above-mentioned polishing body of the above-mentioned polishing tool,

this control parameter or control program preparation apparatus being characterized by the fact that the apparatus comprises simulation means for predicting the distribution of the amount of polishing of the above-mentioned polished surface (that is obtained after the above-mentioned object of polishing has been polished by the above-mentioned polishing apparatus) according to assumed or set control parameters or an assumed or set control program using the simulation method according to Claim 1, and

judgement means for judging the acceptability of the above-mentioned assumed or set control parameters or control program by comparing the distribution of the amount of polishing predicted by the above-mentioned simulation means and a target distribution of the amount of polishing of the polished surface of the above-mentioned object of polishing.

Claim 21 (withdrawn) The preparation apparatus according to Claim 22, which is characterized by the fact that the apparatus comprises means which change the above-mentioned assumed or set control parameters or control program to control parameters or a control program that are altered at least in part with respect to the control parameters or control program already judged to be "unacceptable" by the above-mentioned judgement means in cases where a judgement of "unacceptable" is made in the above-mentioned judgement stage, and which cause the above-mentioned simulation means and the above-mentioned judgement means to repeat their operation in that order until the control parameters or control program obtained are judged to be "acceptable."

Claim 22 (withdrawn) A method for polishing an object of polishing using a polishing apparatus which polishes this object of polishing by causing relative motion between this object of polishing and a polishing body that is supported by a substrate while applying a load between this object of polishing and the above-mentioned polishing body, this polishing method being characterized by the fact that the above-mentioned object of polishing is polished by operating the above-mentioned polishing apparatus in accordance with control parameters or a control program prepared by the control parameter or control program preparation method according to Claim 9.

Claim 23 (withdrawn) A method for polishing an object of polishing using a polishing apparatus which polishes this object of polishing by causing relative motion between this object of polishing and a polishing body that is supported by a substrate while applying a load between this object of polishing and the above-mentioned polishing body, this polishing method being characterized by the fact that the above-mentioned object of polishing is polished by operating the above-mentioned polishing apparatus in accordance with different control parameters or a different control program according to an indicator which indicates the height distribution of the polishing surface of the above-mentioned polishing body with reference to the above-mentioned substrate when no pressure is applied to this polishing body, and

the above-mentioned indicator is one indicator or a combination of two or more indicators selected from a set comprising the number of times that a dressing process is performed on the above-mentioned polishing body, the cumulative time of the dressing processes performed on the above-mentioned polishing body, the number of times that polishing is

performed on the above-mentioned object of polishing by the above-mentioned polishing body, and the cumulative time of the polishing that is performed on the above-mentioned object of polishing by the above-mentioned polishing body.

Claim 24 (withdrawn) A polishing apparatus which polishes an object of polishing by causing relative motion between this object of polishing and a polishing body that is supported by a substrate while applying a load between this object of polishing and the above-mentioned polishing body, this polishing apparatus being characterized by the fact that the above-mentioned object of polishing is polished in accordance with control parameters or a control program prepared by the control parameter or control program preparation method according to Claim 9.

Claim 25 (withdrawn) A polishing apparatus which polishes an object of polishing by causing relative motion between this object of polishing and a polishing body that is supported by a substrate while applying a load between this object of polishing and the above-mentioned polishing body,

this polishing apparatus being characterized by the fact that the apparatus comprises control means for controlling the operation of the above-mentioned polishing using different control parameters or in accordance with a different control program according to an indicator which indicates the height distribution of the polishing surface of the above-mentioned polishing body with reference to the above-mentioned substrate when no pressure is applied to this polishing body, and

the above-mentioned indicator is one indicator or a combination of two or more indicators selected from a set comprising the number of times that a dressing process is performed on the above-mentioned polishing body, the cumulative time of the dressing processes performed on the above-mentioned polishing body, the number of times that polishing is performed on the above-mentioned object of polishing by the above-mentioned polishing body, and the cumulative time of the polishing that is performed on the above-mentioned object of polishing by the above-mentioned polishing body.

Claim 26 (withdrawn) The polishing apparatus according to Claim 24, which is characterized by the fact that the polishing of the above-mentioned object of polishing is chemical mechanical polishing which is performed with a polishing agent interposed between the above-mentioned polishing body and the above-mentioned object of polishing.

Claim 27 (withdrawn) A computer-readable recording medium on which a program is recorded that is used to realize in a computer a simulation function that predicts the distribution of the amount of polishing of the polished surface of an object of polishing after this object of polishing has been polished by causing relative motion between this object of polishing and a polishing body that is supported by a substrate while applying a load between this object of polishing and the above-mentioned polishing body,

this computer-readable recording medium being characterized by the fact that the above-mentioned simulation function simulates the amount of polishing in individual partial regions of the polished surface of the above-mentioned object of polishing following the polishing of this

object of polishing, this function includes a function that simulates the amount of polishing using an indicator which indicates the height distribution of the polishing surface of the above-mentioned polishing body with reference to the above-mentioned substrate when no pressure is applied to this polishing body, as one of the parameters used in the calculations performed by this function, and

the above-mentioned indicator is one indicator or a combination of two or more indicators selected from a set comprising the number of times that a dressing process is performed on the above-mentioned polishing body, the cumulative time of the dressing processes performed on the above-mentioned polishing body, the number of times that polishing is performed on the above-mentioned object of polishing by the above-mentioned polishing body, and the cumulative time of the polishing that is performed on the above-mentioned object of polishing by the above-mentioned polishing body.

Claim 28 (withdrawn) A computer-readable recording medium on which a program is recorded that is used to realize in a computer a simulation function that predicts the shape of the polished surface of an object of polishing or the film thickness distribution on the side of the above-mentioned polished surface after this object of polishing has been polished by causing relative motion between this object of polishing and a polishing body that is supported by a substrate while applying a load between this object of polishing and the above-mentioned polishing body,

this computer-readable recording medium being characterized by the fact that the above-mentioned simulation function is a function which calculates the amount of polishing in

individual partial regions of the polished surface of the above-mentioned object of polishing following the polishing of this object of polishing, this function includes a function that performs calculations using an indicator which indicates the height distribution of the polishing surface of the above-mentioned polishing body with reference to the above-mentioned substrate when no pressure is applied to this polishing body, as one of the parameters used in the calculations performed by this function, and

the above-mentioned indicator is one indicator or a combination of two or more indicators selected from a set comprising the number of times that a dressing process is performed on the above-mentioned polishing body, the cumulative time of the dressing processes performed on the above-mentioned polishing body, the number of times that polishing is performed on the above-mentioned object of polishing by the above-mentioned polishing body, and the cumulative time of the polishing that is performed on the above-mentioned object of polishing by the above-mentioned polishing body.

Claim 29 (withdrawn) A computer-readable recording medium on which a program is recorded that is used to cause a computer to execute control parameter or control program preparation processing that prepares control parameters or a control program used to control a polishing apparatus that polishes an object of polishing by causing relative motion between this object of polishing and a polishing body that is supported by a substrate while applying a load between this object of polishing and the above-mentioned polishing body,

this computer-readable recording medium being characterized by the fact that the above-mentioned control parameter or control program preparation processing includes (a) a simulation

stage in which the distribution of the amount of polishing of the above-mentioned polished surface (that is obtained after the above-mentioned object of polishing has been polished by the above-mentioned polishing apparatus) is predicted in accordance with assumed or set control parameters or an assumed or set control program, and (b) a judgement stage in which the acceptability of the control parameters or control program assumed in the above-mentioned assuming stage is judged by comparing the distribution of the amount of polishing predicted in the above-mentioned simulation stage with a target distribution of the amount of polishing of the polished surface of the above-mentioned object of polishing,

the above-mentioned simulation stage includes a stage in which the amount of polishing in individual partial regions of the polished surface of the above-mentioned object of polishing following the polishing of this object of polishing is predicted using an indicator which indicates the height distribution of the above-mentioned polishing surface of the above-mentioned polishing body with reference

to the above-mentioned substrate when no pressure is applied to this polishing body, as one of the parameters used in the calculations performed in this stage, and

the above-mentioned indicator is one indicator or a combination of two or more indicators selected from a set comprising the number of times that a dressing process is performed on the above-mentioned polishing body, the cumulative time of the dressing processes performed on the above-mentioned polishing body, the number of times that polishing is performed on the above-mentioned object of polishing by the above-mentioned polishing body, and the cumulative time of the polishing that is performed on the above-mentioned object of polishing by the above-mentioned polishing body.

Claim 30 (withdrawn) The computer-readable recording medium according to Claim 29, which is characterized by the fact that in cases where a judgement of "unacceptable" is made in the above-mentioned judgement stage, the above-mentioned control parameter or control program preparation processing changes the above-mentioned assumed or set control parameters or control program to control parameters or a control program which are altered at least in part with respect to the control parameters or control program already judged to be "unacceptable" in the above-mentioned judgement stage, and the above-mentioned simulation stage and above-mentioned judgement stage are repeated in that order until the control parameters or control program obtained are judged to be "acceptable."

Claim 31 (withdrawn) A polishing system which comprises

a polishing apparatus that polishes an object of polishing by causing relative motion between this object of polishing and a polishing body that is supported by a substrate while applying a load between this object of polishing and the above-mentioned polishing body, and

a control parameter or control program preparation apparatus which prepares control parameters or a control program used to control the above-mentioned polishing apparatus,

this polishing system being characterized by the fact that the above-mentioned control parameter or control program preparation apparatus includes (a) assuming means for assuming control parameters or a control program to be used in a simulation in accordance with the target distribution of the amount of polishing, (b) simulation means for predicting the distribution of the amount of polishing of the above-mentioned polished surface (that is obtained after the

above-mentioned object of polishing has been polished by the above-mentioned polishing apparatus) by the simulation method according to Claim 1 using the parameters assumed by the above-mentioned assuming means, and (c) judgement means for judging the acceptability of the control parameters or control program assumed by the above-mentioned assuming means by comparing the distribution of the amount of polishing predicted by the above-mentioned simulation means and the above-mentioned target distribution of the amount of polishing, and

the above-mentioned polishing apparatus polishes the above-mentioned object of polishing in accordance with control parameters or a control program prepared by the above-mentioned control parameter or control program preparation apparatus.

Claim 32 (withdrawn) A polishing system which comprises

a polishing apparatus that polishes an object of polishing by causing relative motion between this object of polishing and a polishing body that is supported by a substrate while applying a load between this object of polishing and the above-mentioned polishing body, and a control parameter or control program preparation apparatus which prepares control parameters or a control program used to control the above-mentioned polishing apparatus,

this polishing system being characterized by the fact that the above-mentioned control parameter or control program preparation apparatus includes (a) assuming means for assuming control parameters or a control program to be used in a simulation in accordance with the target distribution of the amount of polishing, (b) simulation means for predicting the distribution of the amount of polishing of the above-mentioned polished surface (that is obtained after the above-mentioned object of polishing has been polished by the above-mentioned polishing

apparatus) by means of the simulation apparatus according to Claim 12 using the parameters assumed by the above-mentioned assuming means, and (c) judgement means for judging the acceptability of the control parameters or control program assumed by the above-mentioned assuming means by comparing the distribution of the amount of polishing predicted by the above-mentioned simulation means and the above-mentioned target distribution of the amount of polishing, and

the above-mentioned polishing apparatus polishes the above-mentioned object of polishing in accordance with control parameters or a control program prepared by the above-mentioned control parameter or control program preparation apparatus.

Claim 33 (withdrawn) The polishing system according to Claim 31, which is characterized by the fact that in cases where a judgement of "unacceptable" is made in the above-mentioned judgement stage, the above-mentioned control parameter or control program preparation apparatus changes the above-mentioned assumed or set control parameters or control program to control parameters or a control program which are altered at least in part with respect to the control parameters or control program already judged to be "unacceptable" by the above-mentioned judgement means, and this polishing system includes means for causing the above-mentioned simulation means and the above-mentioned judgement means to repeat their operations in that order until the control parameters or control program obtained are judged to be "acceptable."

Claim 34 (withdrawn) The polishing system according to Claim 32, which is characterized by the fact that in cases where a judgement of "unacceptable" is made in the above-mentioned judgement stage, the above-mentioned control parameter or control program preparation apparatus changes the above-mentioned assumed or set control parameters or control program to control parameters or a control program which are altered at least in part with respect to the control parameters or control program already judged to be "unacceptable" by the above-mentioned judgement means, and this polishing system includes means for causing the above-mentioned simulation means and the above-mentioned judgement means to repeat their operations in that order until the control parameters or control program obtained are judged to be "acceptable."

Claim 35 (withdrawn) The polishing system according to Claim 32, which is characterized by the fact that the input of the control parameters or control program prepared by the above-mentioned control parameter or control program preparation apparatus into the above-mentioned polishing apparatus is performed automatically or in response to commands.

Claim 36 (withdrawn) The polishing system according to Claim 32, which is characterized by the fact that the input of the control parameters or control program prepared by the above-mentioned control parameter or control program preparation apparatus into the above-mentioned polishing apparatus is performed automatically or in response to commands.

Claim 37 (withdrawn) The polishing system according to Claim 31, which is characterized by the fact that the polishing of the above-mentioned object of polishing is chemical mechanical polishing which is performed with a polishing agent interposed between the above-mentioned polishing body and the above-mentioned object of polishing.

Claim 38 (withdrawn) The polishing system according to Claim 31, which is characterized by the fact that the polishing of the above-mentioned object of polishing is chemical mechanical polishing which is performed with a polishing agent interposed between the above-mentioned polishing body and the above-mentioned object of polishing.

Claim 39 (withdrawn) A semiconductor device manufacturing method which is characterized by the fact that this method has a process in which the surface of a semiconductor wafer is flattened using the polishing apparatus according to Claim 24.

Claim 40 (withdrawn) A semiconductor device manufacturing method which is characterized by the fact that this method has a process in which the surface of a semiconductor wafer is flattened using the polishing apparatus according to Claim 25.

Claim 41 (withdrawn) A semiconductor device manufacturing method which is characterized by the fact that this method has a process in which the surface of a semiconductor wafer is flattened using the polishing apparatus according to Claim 26.

Claim 42 (withdrawn) A semiconductor device manufacturing method which is characterized by the fact that this method has a process in which the surface of a semiconductor wafer is flattened using the polishing system according to Claim 31.

Claim 43 (withdrawn) A semiconductor device manufacturing method which is characterized by the fact that this method has a process in which the surface of a semiconductor wafer is flattened using the polishing system according to Claim 32.

Claim 44 (Currently Amended) A method of controlling an apparatus that polishes a surface by causing relative motion between the surface and a face of a polishing body supported by a substrate while applying a load between the surface and the face of the polishing body, the polishing body having an elastic constant, the method comprising:

a simulation stage in which a distribution of an amount of polishing of the surface is predicted according to set control parameters or a set control program using a simulation method; and

a judgment stage in which the acceptability of the set control parameters or control program is judged by comparing the distribution of the amount of polishing predicted in the simulation stage to a ~~target~~ desired distribution of an amount of polishing of the surface;

wherein ~~a~~ the simulation method is characterized by a step which predicts ~~an~~ the amount of polishing of discrete portions of the surface using an indicator which determines a height distribution of the ~~surface~~ face of the polishing body with reference to the substrate when no

pressure is applied to the polishing body, and ~~using~~ uses the height distribution ~~as a parameter~~ and the elastic constant in calculations performed in the simulation stage; and

the indicator comprises at least one indicator method selected from a set ~~comprising~~ consisting of a number of times that a dressing process is performed on the polishing body, the cumulative time of the dressing processes performed on the surface by the polishing body, and the cumulative time of polishing performed on the surface by the polishing body.

Claim 45 (Previously Presented) The method according to claim 44, wherein if the judgment in the judgment stage is unacceptable, the set control parameters or control program are changed with respect to the control parameters or control program already judged unacceptable in the judgment stage, and the simulation stage and judgment stage are repeated in that order until the control parameters or control program obtained is judged to be acceptable.

Claim 46 (Previously Presented) The method according to claim 44, wherein the height distribution of the polishing body is successively predicted on the basis of the indicator, and the amount of polishing in the partial regions predicted on the basis of the most recently predicted height distribution.

Claim 47 (Previously Presented) The method according to claim 45, wherein the prediction of the height distribution is performed following a dressing of the polishing body.

Claim 48 (Previously Presented) The method according to claim 45, wherein the prediction of the height distribution is accomplished by referring to a look-up table or equation which provides a relationship between the height distribution and at least one parameter selected from a set comprising the number of times that a dressing process is performed on the polishing body, the cumulative time of the dressing processes performed on the surface by the polishing body, and the cumulative time of polishing performed on the surface by the polishing body.

Claim 49 (Previously Presented) The method according to claim 45, wherein the prediction of the height distribution is performed in accordance with Preston's equation.

Claim 50 (Previously Presented) The method according to claim 44, wherein the polishing is chemical mechanical polishing performed with a polishing agent interposed between the polishing body and the surface.